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October 12, 2011

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Room TWA325
Washington, DC 20554

RE: Report on the Value of the 700-MHz D Block

Dear Ms. Dortch:

Please find attached a report I wrote providing an analysis of the highest and best use of the 700-MHz D Block. This report looks at the D Block from both a financial and highest and best use case and concludes that the short-term gain from the sale of the D Block will be less than the Congressional Budget Office has forecast. Furthermore, the intermediate-term cost of auctioning the D Block will cost Federal and local taxpayers many times the amount that could be realized by auction of this spectrum.

The report goes on to show the true value of the D Block in terms of financial gain for the Federal Government versus the additional costs that will be incurred by both the D Block winner and the public safety community if the D Block is auctioned and becomes a separate commercial network.

One of the most important conclusions of this report is that if the D Block is auctioned and public safety retains only the 10 MHz of spectrum presently allocated, public safety won't be able to migrate mission-critical voice to the public safety broadband network when and if it becomes available because of the lack of broadband spectrum provided by the 10 MHz of spectrum that public safety now holds. This has implications for the return of some of the public safety voice spectrum in the future, spectrum that could bring in many times the proceeds from a D Block auction.

The conclusion is that the highest and best use of the D Block is for it to be reallocated by Congress to the public safety license holder so it can be used to provide the public safety community with the bandwidth it needs for broadband and eventually voice services over broadband.

Respectfully Submitted,

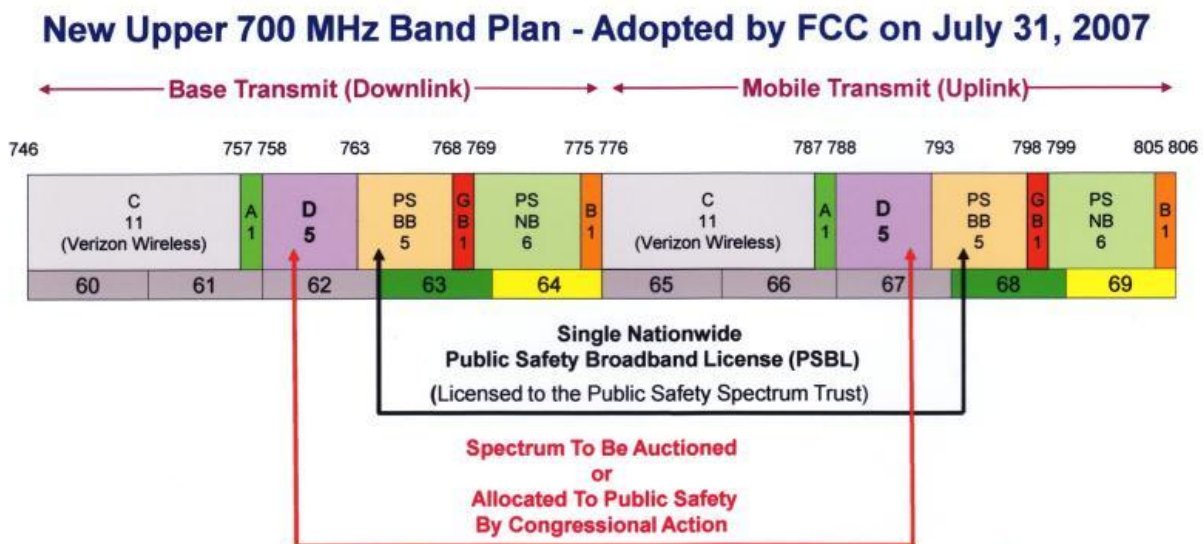
Andrew M. Seybold
CEO and Principal Consultant

Public Safety Advocate, October 10, 2011
Andrew M. Seybold

The Value of the D Block

Introduction

The D Block, (758-763 MHz and 788-793 MHz) is the 10 MHz of spectrum (5MHz X 5 MHz) that sits next to the Public Safety 10 MHz of spectrum (5 MHz X 5 MHz) presently licensed to the Public Safety Spectrum Trust on a nationwide basis. On the other side of the D Block is a guard band that is 1 MHz wide. This guard band is licensed for itinerant use and was included in the 700-MHz band plan in order to provide a buffer zone between the C Block (licensed to Verizon Wireless on a nationwide basis) and the Public Safety spectrum.



The question before Congress at the moment is what the value of this 10 MHz of spectrum is to various stakeholders. In reality, this translates to what is the highest and best use to which this spectrum can be put and who will benefit from this decision. There are presently two options on the table for the D Block:

- 1) Auction the spectrum and apply the proceeds to reduce the national debt.
 - a. Although the current law requires the money to be deposited directly into the U.S. Treasury. If it is to be used for deficit reduction a revision in the law will be required.
- 2) Auction the spectrum and use the proceeds to help build out the Public Safety network on its existing 10 MHz of spectrum.
 - a. This too would require a change in the current law.

- 3) Reallocate this spectrum to Public Safety so it has 20 MHz of contiguous spectrum available on a nationwide basis.
 - a. This also requires a change to existing law and is part of the current S 911 bill waiting to reach the floor of the Senate for a vote.

Those who favor auctioning the D Block point to the fact that this spectrum, at auction, is expected to generate between \$2.6 and \$3 billion (the Congressional Budget Office set the price for the D block at \$2.75 Billion in their scoring of Senate bill 911¹) in revenue for the Federal Government. They also believe that auctioning this spectrum will create another broadband competitor in the 700-MHz band, most of which (but not all) is licensed to AT&T and Verizon Wireless.

Those who favor the reallocation of the D Block to Public Safety point to a number of reasons this should happen:

- The existing 10 MHz of spectrum is not sufficient to provide first responders with the broadband capabilities they need on a daily basis.
- The D Block is contiguous to the existing Public Safety spectrum and the cost of adding this additional spectrum to the Public Safety spectrum would be minimal whereas adding additional spectrum in the future in a different portion of the spectrum would be very costly.
- If Public Safety is, ultimately, to move voice onto the broadband spectrum and give back some of its existing narrowband spectrum, the additional bandwidth provided by the D Block will be needed on a daily basis. Without it, it will not be possible to migrate mission-critical voice to the broadband network.
- It is an investment in Public Safety communications and will provide the first fully interoperable nationwide broadband network for Public Safety communications.

This paper looks at both sides of this equation and sets the true value of the D Block if it is auctioned in order to provide a clear picture of the two choices presently under consideration. It is important that those in a position to make this decision have all of the facts on both sides of the debate available in order to be able to make the correct decision moving forward. On the one hand is the extreme need to reduce our national debt and on the other hand is the issue of providing the first responder community with all of the tools it needs to protect the citizens of this nation and itself.

Realities of Spectrum and Broadband

Before attempting to place a monetary value on the D Block, it is important to understand exactly how much of this spectrum is really available for use by the winning bidder(s), the capacity of that spectrum, the implications of building out a commercial network, and the cost of doing so. It is also important to

¹ <http://www.utcsight.org/content/cbo-scores-public-safety-bill-lower-expected>

look back at the previous 700-MHz auction in which the D Block was first offered as part of a public partnership with Public Safety and the reasons it failed to attract any serious bidders.

When deploying broadband for either commercial or Public Safety use, the broadband radio signals cannot be deployed to occupy the entire portion of the allocated spectrum. Broadband networks have to be designed so there is some unused spectrum on either side of a broadband carrier in order to protect the spectrum user in the adjacent portions of the spectrum. This is the same premise that was used when first deploying TV stations across the nation. There could not be two TV stations using channels adjacent to each other in a given area since they would interfere with each other and the TV sets would not be able to receive either signal without interference.

Knowing this, when the FCC first defined the various blocks within the 700-MHz band it did so in a logical fashion making each block—with the exception of the D Block and the Public Safety spectrum—large enough so each block that was carved out for auction was wider than the broadband signal that would be used in that portion of the spectrum. Therefore, the Lower A and B Blocks are each 6 MHz X 6 MHz or 12 MHz, and the Upper C Block is 11 MHz X 11 MHz or 22 MHz wide. This permits a network operator to deploy a 5 MHz X 5 MHz broadband system within each Lower A and B Block and a 10-MHz system within the Upper C Block and still provide their own buffer zones of ½ MHz on either side of their block of spectrum.

However, the D Block and the Public Safety spectrum were each allocated 5 MHz X 5 MHz or 10 MHz total of spectrum because it was envisioned that the system built on these two portions of the spectrum would be a combined public/private system and therefore the FCC inserted two 1 MHz X 1 MHz bands between the C Block and the D Block on one side and between the Public Safety Block and the D Block on the other side. This spectrum was sold at auction and is to be used for itinerant communications systems across the United States, which would have made it easier for the entire 20 MHz of spectrum to be available for broadband services. However, if the two networks are separate, that is a commercial network on the D Block and the Public Safety network on the existing Public Safety allocation, then both networks will have to reduce the size of their broadband signals in order to provide for their own guard band between the two systems just as commercial network operators have had to do.

The chart below depicts the 700-MHz spectrum blocks and the amount of usable spectrum within each one:

Existing 700-MHz Band Spectrum Blocks

700 MHz Band	Total Spectrum	Usable Spectrum	Guard Band	Max Capacity
Lower A Block	12 MHz (6X6)	10 MHz (5X5)	0.5 MHz each side	19 Mbps
Lower B Block	12 MHz (6X6)	10 MHz (5X5)	0.5 MHz each side	19 Mbps
Upper C Block	22 MHz (11X11)	20 MHz (10X10)	0.5 MHz each side	40 Mbps
Upper D Block	10 MHz (5X5)	8 MHz (4X4)	0.5 MHz each side	15.2 Mbps
Upper Public Safety Block	10 MHz (5X5)	8 MHz (4X4)	0.5 MHz each side	15.2 Mbps

Note: D Block and Public Safety maximum data capacity is calculated at 20% reduction over 5 MHz X 5 MHz spectrum numbers.

If the D Block and the Public Safety allocation are combined, the total available spectrum and the capacity available on a per cell sector basis is as follows:

Combined D Block and Public Safety Spectrum

Combined Bands	Total Spectrum	Usable Spectrum	Guard Bands	Max Capacity
D/Public Safety	20 MHz (10X10)	20 MHz (10X10)	External to Band	40 Mbps

Note: Because the A1 and GB1 spectrum guard bands are already in place the full 20 MHz of spectrum could be available for Public Safety broadband communications.

Impact on Spectrum Value

Because the D Block did not receive a qualifying bid it was not awarded to any operator and the concept of a public/private partnership did not come to realization. This leaves us with two 10 MHz (5 MHz X 5 MHz) portions of the 700-MHz spectrum directly adjacent to each other. This means that if this spectrum continues to be divided into two separate allocations, one for commercial use and one for Public Safety, the amount of spectrum available for use on each of these segments will *NOT* be 10 MHz but will be only 8 MHz (4 MHz X 4 MHz instead of 5 MHz X 5 MHz), which means that the available spectrum for both the D Block and Public Safety will be reduced by 20% from what should have been available.

This 20% reduction will do a number of things to both the value and usability of this spectrum:

- It will reduce the value of the D Block by at least 20% if not more.
- In order to regain the lost capacity, both networks will be required to build out many additional cell sites (20% or more).
- The overall cost of a network on the D Block will be higher than a similar network built on the A and B Blocks (6 MHz X 6 MHz). Therefore, the price any commercial entity would be willing to pay will be substantially less.

If we compare a 20% reduction in spectrum value with the expected revenue of \$2.8-\$3 billion, then the D Block is now worth no more than \$2.24-\$2.4 billion at auction. In reality, since additional cell sites and infrastructure costs will be incurred by the successful D Block bidder(s), and this cost will be substantial, the probability is that the D Block, if auctioned as a standalone portion of spectrum, will be won for less than \$2 billion. Meanwhile, because Public Safety will not be able to use all of the 10 MHz already allocated to it and will also have to reduce the broadband bandwidth to 4 MHz X 4 MHz, the cost of the Public Safety network will increase by at least 20% if not more *AND* with only 8 MHz of spectrum available for data, the ability to employ this spectrum for video services during routine incidents will be greatly diminished as well. Further, with only 8 MHz of spectrum available on a nationwide basis, it will not be possible to migrate mission-critical voice to this network while still retaining the ability to use it for broadband services.

The results of auctioning the D Block and reducing the overall available bandwidth in the Public Safety portion of the spectrum will have additional implications both for the commercial and Public Safety side. On the commercial side, the overall network, even with additional cell sites being added to make up for the capacity, will not have sufficient capacity to provide commercial broadband services to the number of customers needed to provide a decent return on investment (ROI) for the commercial network

operator. Those that would be interested in bidding on the D Block will factor this into their calculations of the value of the D Block if it is offered for auction.

On the Public Safety side, the additional costs will be significant. Today, the FCC and others have stated that in order to provide Public Safety broadband communications to 96% of the U.S. population, between 41,000 and 44,000 cell sites² will be needed. If the D Block is not available to Public Safety then the number of sites—each of which adds several hundred thousand dollars in capital costs as well as additional network operation costs—will have to grow to between 49,200 and 52,800 sites. This will result in a network that will cost taxpayers more, take longer to construct, and will still not provide the Public Safety community with enough broadband spectrum for its day-to-day needs³ or to be able to be used for both mission-critical voice and data. The result is that any spectrum that might have been made available by migrating the Public Safety community to broadband for mission-critical voice will still be required by Public Safety. Therefore, any auction income from this spectrum will not be available. It is conceivable that the revenue lost to the Federal Government would be two or three times the value of the D Block auction price.

It should also be noted that the cost to build out either a 10 MHz or 20-MHz Public Safety nationwide broadband network are identical. However, the cost to build out a 10-MHz Public Safety network and then, within a few years, augment it with additional spectrum in another portion of the spectrum will double the total cost of the Public Safety network *AND* will require all Public Safety entities to discard their broadband devices and acquire new broadband devices that will cover both portions of the spectrum.

Conclusions

There is a perception among some within the Federal Government that the benefits of auctioning the D Block make this an obvious choice. However, the reality is that putting the D Block up for auction will, within a few years, have the following results:

- Cause the costs to build and maintain the Public Safety network to climb by at least 20% if not more.
- Cost the auction winner(s) more to build out their own networks making it more difficult for them to be competitive in the commercial market.
- Provide less capacity for both a commercial operator and for Public Safety than on other portions of the 700-MHz band.
- Would not meet the needs of either a commercial network operator or the Public Safety community in terms of broadband capacity.
- Would preclude Public Safety from migrating mission-critical voice to the broadband network when it becomes available, which in turn will result in none of the existing Public Safety

² A Broadband Network Cost Model OBI Technical Paper No. 2, May 2010, page 3
<http://transition.fcc.gov/pshs/docs/ps-bb-cost-model.pdf>

³ "Report on LTE Public Safety Network Capacity Testing," Andrew Seybold, Inc.
<http://fjallfoss.fcc.gov/ecfs/document/view?id=7021709918>

spectrum being available to be reclaimed for future broadband expansion of commercial services.

- Cost taxpayers much more when in a few years Public Safety must return to the FCC and ask for even more spectrum allocations in order to provide the types of services it needs to function on a day-to-day basis.

It has been demonstrated that even the broadband capacity provided by a full 10 MHz of spectrum (5 MHz X 5 MHz) is insufficient for day-to-day Public Safety broadband communications.⁴ Reducing the available network capacity by 20% as detailed above will only exacerbate the issues surrounding the lack of capacity. As has been shown many times, the idea of having priority access to the commercial networks is unworkable and not reliable.⁵ Therefore, Public Safety must have sufficient broadband capacity available to it on a daily basis. The use of broadband for video, data, and at some point in time mission-critical voice⁶ demands that Public Safety have sufficient broadband capacity available and under its control.

The idea of auctioning the D Block, which is directly adjacent to the Public Safety broadband spectrum, might seem attractive to some in the short term, but in the long term the financial implications are that it will cost much more, over time, in taxpayer funding to build a second network for Public Safety broadband use because the spectrum presently allocated is not sufficient. Commercial broadband demand is growing exponentially and once the Public Safety network is in place this same type of increased demand for broadband services will occur within the Public Safety community as well.

The Congressional Budget Office has provided its estimate of the amount of money from auctions for the spectrum identified by the FCC. Its estimate is that it will generate \$24 billion⁷ in revenue and after incentive payments to TV license holders, and deducting the cost of the Public Safety broadband network, the net funds available to reduce the deficit will only be in the \$6 billion range. (It should be noted here that the CBO also projected revenue from Auction 73, the 700-MHz spectrum auction, to be about \$10 billion and the actual amount raised was more than \$19 billion.) However, based on the last two spectrum auctions, the AWS-1 and 700-MHz spectrum auctions, industry estimates put the total value of the spectrum already identified, without the D Block, at between \$40 and \$54 billion. Using the same costs for incentive payments and funding the Public Safety broadband network, these numbers will yield between \$20 and \$30 billion for deficit reduction purposes.

Therefore, the perception that auctioning the D Block is the right way to proceed is contradicted by the realities outlined above. The true benefit to the United States as far as economic growth, job growth, and providing Public Safety with the advanced broadband tools it so badly needs to do its job and protect all of the citizens of the United States lies in the reallocation of the D Block to Public Safety and for the Federal Government to fund some of the cost of building the nationwide network from funds that will be realized from the upcoming auctions of spectrum already identified by the FCC. It should

⁴ "Results of Public Safety LTE Network Testing," Andrew Seybold Inc.
<http://fjallfoss.fcc.gov/ecfs/document/view?id=7021709918>

⁵ "Cell Phones and Nature" by Andrew Seybold <http://andrewseybold.com/2617-cell-phones-and-nature>

⁶ "Mission-Critical Voice and LTE: Be Careful," Andrew Seybold <http://andrewseybold.com/2611-mission-critical-voice-and-lte-be-careful>

⁷ <http://www.cbo.gov/ftpdocs/123xx/doc12322/s911.pdf>

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also be pointed out that in the FCC's broadband plan⁸ it has stated that it will find and make available a total of 500 MHz of additional spectrum over the next ten years. Therefore, these first auctions will be followed by others that will result in more money with which to continue to reduce the national debt. Reallocating the D Block is logical, it meets the highest and best use criteria for spectrum allocations, and for the first time it results in providing nationwide interoperability for the first responder community from coast to coast and border to border. It will also result in broadband for rural America faster and less expensively than any other proposal presented so far by any branch of the Federal Government.

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⁸ <http://www.broadband.gov/issues/public-safety.html>